



# TECHNICAL UNIVERSITY OF MOMBASA

## Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

UNIVERSITY EXAMINATION FOR DEGREE OF:

**BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY (BSIT)**

SMA 2102: PROBABILITY & STATISTICS

**END OF SEMESTER EXAMINATION**

SERIES: DECEMBER 2014

**TIME ALLOWED: 2 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Mathematical tables*
- *Scientific Calculator*

This paper consist of **FOUR** questions

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

Maximum marks for each part of a question are as shown

This paper consists of **THREE** printed pages

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**Question One (Compulsory)**

- a) (i) State Baye's Theorem **(2 marks)**  
(ii) Analysis of questionnaires completed by holiday makers showed that 0.75 classified holiday as good at Malindi. The probability of hot weather in the resort is 0.6. If the probability of regarding holiday as good given hot weather is 0.9, what is the probability that there was hot weather if a holiday maker considers his holiday good? **(4 marks)**
- b) State the methods of collection of primary data **(3 marks)**
- c) Define the following terms:  
(i) Skewness **(2 marks)**  
(ii) Kurtosis **(2 marks)**
- d) Compute the mean and standard deviation of the following data: **(5 marks)**

Observation (x)	0	1	2	3	4
Frequency (f)	5	2	13	16	3

- e) Given the data below construct a grouped frequency distribution table with class size of 10 **(3 marks)**

		4	5	5	5	5
80	8	5	4	6	0	9
	3	6	8	6	5	8
70	0	0	7	0	4	1
	3	7	9	6	5	7
73	3	3	5	0	4	6
	9	4	2	4	1	7
40	0	6	1	0	8	0
	1	8	1	7		5
23	6	1	7	5	5	1

$$\sum x = 440, \sum y = 4400, \sum xy = 25607, \sum x^2 = 25796, n = 10$$

- f) Find a and b in  $y = a + bx$  given that **(5 marks)**
- g) Define the terms: **(2 marks)**
- (i) Sample space **(2 marks)**
- (ii) Random variable **(2 marks)**

### Question Two

- a) The following data was obtained from the manufacturers of electronic cells. A sample of electronic cells was taken and life spans were recorded as shown in the following table:

Life span (hrs)	1600-1799	1800-1999	2000-2199	2200-2399	2400-2599	2600-2799	2800-2999
No of cells	25	32	46	58	40	30	7

Using the assumed mean  $A = 2299.5$ , find:

- (i) Mean life span of cells **(5 marks)**
- (ii) Standard deviation of the life span of cells **(4 marks)**
- (iii) Variance of the life span of the cells **(2 marks)**
- b) On the same graph, construct a histogram and a frequency polygon for the data in (a) above hence estimate the mode **(9 marks)**

### Question Three

- a) Students in a Statistics class claimed that doing the homework had not helped prepare them for the midterm exam. The exam score  $y$  and homework score  $x$  for the 18 students in the class were as follows:

y	95	80	0	0	79	77	72	68	98	90	0	95	35	50	72	55	75	66
x	96	77	0	0	78	64	89	47	90	93	18	86	0	30	59	77	74	67

- (i) Find a regression line which best explains the relationship between x and y **(6 marks)**
- (ii) Find the coefficient of determination  $R^2$  and give its interpretation **(4 marks)**
- (iii) Predict the score of a student who scored 40% in the homework **(3 marks)**

b) Plot a scatter diagram and the regression line for the data in (a) above **(7 marks)**

#### Question Four

a) Calculate the median and mode for the following frequency distribution table:

Class	3-7	8-12	13-17	18-22	23-27	28-32
Frequency	15	13	27	29	10	13

**(7 marks)**

b) (i) Give THREE characteristics of a negative skewed curve **(3 marks)**

(ii) Using the above data in (a) compute the first and third quartiles and hence compute the quartile coefficient of skewness. Comment on the skewness of the frequency distribution **(10 marks)**

#### Question Five

a) From past experience a machine is known to be set up correctly on 90% of occasions. If the machine is set up correctly the 95% of good parts are expected that if the machine is not set up correctly, then the probability of a good part is on 30%. On a particular day the machine is set up and the first component produced and found to be good. What is the probability that the machine is set up correctly **(5 marks)**

b) (i) Compute the 20<sup>th</sup> and 80<sup>th</sup> percentile of the data below: **(6 marks)**

Class	201-250	521-300	301-350	351-400	401-450	451-500	501-550
Frequency	25	36	749	80	51	42	30

(ii) Compute the standard deviation of the data in b(i) above using the coded method **(9 marks)**